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REMEDIAL INVESTIGATION
PHASE II AND III
SAUGET PLANT SITE

Proposal
Not Done

Submitted to
CERRO COPPER PRODUCTS COMPANY
Sauget, Illinois

December 8, 1986

Sverdrup

December 8, 1986

Cerro Copper Products Company
P. O. Box 681
East St. Louis, Illinois 62202

Attention: Mr. Sandy A. Silverstein
Manager, Energy and Environmental Affairs

Gentlemen:

Subject: Proposal for a Remedial Investigation
at the Sauget Property

Sverdrup is pleased to submit this proposal for a Remedial Investigation (RI) on the property owned by Cerro Copper Products Company in Sauget, Illinois. We propose to assign our most capable personnel, all of whom are directly experienced with this type of investigation.

The professional services outlined in Sections II and III of this proposal constitutes a remedial investigation of soil, sediment, and groundwater for possible contamination of the Cerro Sauget property. Sverdrup proposes to:

1. Identify contaminant concentrations and patterns in the soils, sediments, surface waters, and groundwater;

2. Define any plumes of contaminated groundwater, and predict the plume dispersion and migration through computer modelling;

3. Define groundwater contaminant concentrations at the upstream borders of the Cerro Sauget property to determine if contaminants are migrating onto the Cerro property; and

4. Identify potential remediation measures.

These items will be completed in a two-stage approach, to minimize sampling and analytical work, and maximize the applicability of the data toward defining the problems. Furthermore, this proposal is predicated upon the completion of the Phase I work proposed to Cerro on October 29, 1986.

We propose to utilize five subcontractors to complete the investigation; well-drilling for the monitoring wells, analytical chemistry for all samples, physical analysis for soil samples from wells, aerial photo-

graphy and analysis for mapping, and electromagnetic conductivity mapping for geophysical testing. The selection of all subcontractors will be subject to Cerro's approval.

The general schedule presented in Section V represents our best estimate of the sequence and duration of the work required. However, as stated, the nature of the work lends itself to unpredictable delays that can sometimes make truly realistic schedules hard to meet. Nevertheless, we will work as diligently as possible to meet the proposed schedule.

The costs presented in Section VI represent our estimate of the costs for the remedial investigation. As with our previous contracts with Cerro, we propose to provide our services on a cost-reimbursable basis as described in the standard contract provisions included in Section VI. Our work proposal and our estimated costs are based on the indemnification conditions described in Section VI.

We are most interested in assisting Cerro in this investigation, and we look forward to working with you on all phases of the remedial investigation work. Please contact me should you need additional information during your evaluation.

Sincerely yours,

SVERDRUP CORPORATION

Jules B. Cohen
Vice President

cc: Paul Tandler, Cerro Copper Products

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PREFACE

The scope of work, and costs presented in this proposal are based on several assumptions:

1. The work presented in the Sverdrup Corporation proposal to Cerro Copper Company (dated 10-29-86) will be completed. Three new wells will have been installed, and all analytical results will be available.
2. The only IEPA well available for our use will be Well #2 as identified in our 10-29-86 proposal (IEPA #G-112).
3. All work will be conducted exclusively on property owned by Cerro Copper Company.
4. Some of the soil/sediment sampling, and all well-installation work will be performed by personnel wearing Level B personal protection. All other site work will be done in Level D protection.

Any deviations from these assumptions will require changes in the scope-of-work and costs contained in this proposal.

I. BACKGROUND

Cerro Copper Products Company currently owns three parcels of property in the Village of Sauget, Illinois (see Figure 1 in Section II). The largest parcel, located between Mississippi Avenue on the west and Monsanto Avenue on the east, is the site of the active secondary copper processing operations (the Cerro Sauget Plant). The small triangular parcel just south of New Queeny Avenue is undeveloped and not presently utilized by Cerro. The rectangular parcel west of Mississippi Avenue opposite the active copper processing facilities is also inactive. This parcel was formally owned by the Darling Fertilizer Company and was used as a fertilizer manufacturing facility.

In 1980, the Illinois Environmental Protection Agency (IEPA) was made aware of potential dangerous soil and water pollution problems in Dead Creek just south of the Cerro Sauget Plant. A hydrogeologic investigation was conducted by IEPA in 1980 that included soil, groundwater, surface water, and sediment sampling on and around the Cerro property east of Mississippi Avenue. The investigation identified several previous dump sites on the Cerro property and found that significant organic and inorganic chemical contamination existed in the holding ponds (Dead Creek) on the Cerro property. As a result of the findings, IEPA fenced off part of Dead Creek south of New Queeny Avenue, and they recommended that the groundwater in the area not be used for human consumption and that a further detailed study be undertaken.

In 1981, USEPA conducted additional limited investigations and installed a permanent chain-link fence to limit access to Dead Creek south of the Cerro property.

In April 1985, IEPA issued a Request for Proposal for a Remedial Investigation/Feasibility Study (RI/FS) for the Sauget and Cahokia, Illinois area, which included the Cerro property east of Mississippi Avenue. A contract for the work was awarded to Ecology and Environment (E&E) about mid-1985.

On November 21, 1985, E&E attempted to begin work on Cerro property in the study area but was refused access by Cerro management pending the filing of a Formal Consent of Entry Agreement. Following several rounds of communications between IEPA and Cerro, Cerro drafted a Consent to Access agreement and presented it to IEPA for review and adoption. As of October 2, 1986, IEPA had not responded to the agreement as proposed by Cerro.

On October 2, 1986, Paul Tandler and Sandy Silverstein of Cerro and Jules Cohen, Ed Preissner, and Larry Oliver of Sverdrup met to discuss the IEPA RI/FS study. As a result of the meeting, Cerro requested that Sverdrup prepare two proposals to conduct work on the Cerro property related to the IEPA RI/FS. One proposal was to be for a preliminary and cursory hydrogeologic investigation to provide data on the general condition of the groundwater, soil, surface water, and sediment on the Cerro property. The purpose of the investigation was to qualitatively

determine if and to what extent chemical contamination is present on the property owned by Cerro. The second proposal was to be for a full-scale remedial investigation on Cerro property patterned after the work proposed by E&E for the IEPA RI/FS study.

This proposal is for the full-scale hydrogeologic investigation. It is based on the transfer of information during the October 2 meeting, the review of the IEPA report for the 1980 preliminary hydrogeologic investigation, the IEPA RFP for the RI/FS, the E&E proposal for the RI/FS, a site inspection on October 17, 1986, the proposal for the preliminary hydrogeologic investigation dated October 29, 1986, and subsequent telephone discussions with Cerro personnel.

II TECHNICAL APPROACH

PHASE II

PURPOSE

To determine the specific locations of any backfilled pits on Cerro property, the groundwater quality in the upper aquifer beneath Cerro, the contaminant patterns in the soils east of Dead Creek, and the existence of any contaminated groundwater plumes beneath Cerro.

Sverdrup's technical approach for the Cerro Sauget Plant Site Remedial Investigation involves the following general areas of activity:

1. Conducting an additional information search to develop history of surrounding property that may be impacting Cerro property.

2. Conduct an aerial survey of Cerro property to obtain topographic drawings to be utilized during this investigation and future remedial work.

3. Preparing for field work.

4. Conduct a geophysical survey of areas east of Dead Creek and the former Darling Fertilizer Property.

5. Conduct soil screening and sampling of areas east of Dead Creek and the former Darling Fertilizer Property.

6. Install additional monitoring wells in an effort to determine extent and source of contamination.

7. Obtain additional sediment samples from Dead Creek to determine extent of contamination.

8. Investigate non-Cerro discharges to Dead Creek.

All of the work identified in Item 6, plus some in Items 5 and 7, will be conducted with personnel wearing Level B protective gear. (Level B consists of a near-total-coverage protective suit, boots, gloves, a full-face respirator, and an attached self-contained breathing apparatus.) This relatively high level of protection is required due to past disposal practices in the area, and contaminant concentrations identified during recent sampling programs. As contamination patterns and concentrations on the Cerro property become better defined, we will reduce our personnel protection levels as allowable. This reduction will decrease costs to the client by reducing manhours and equipment rental for sampling activities.

The work proposed for this investigation is defined below. Figure 1 serves as the principle reference for the discussion.

A. ADDITIONAL INFORMATION SEARCH

A background search of the property will be conducted in the first phase of the study to provide a detailed history of the site. An additional

records search concerning adjoining property will be performed to document past land use that may have impacted or is currently impacting Cerro property. This search is to be concentrated on locating possible sources or explanations for contamination found during the preliminary phase.

B. CONDUCT AERIAL SURVEY OF PROPERTY

An aerial topographic survey is required to provide an accurate site layout. The data will be digitized and the information shall be available for use on Sverdrup's Auto-Cad system. The drawings shall be usable for all future environmental work including remedial tasks, as well as any future construction on the Cerro property.

C. PREPARATION FOR FIELD WORK

Proper planning and preparation are important to the successful and safe completion of any investigation involving potentially hazardous materials. This tends to reduce the amount of time required to accomplish the field work, provide the data required, and greatly reduces the risk of spreading contamination and exposure. In this regard, the following tasks will be performed under this activity:

1. Develop a comprehensive work plan and schedule.

2. Develop a health and safety plan for personnel at the site.

3. Establish each sampling location, physically locate and identify utilities at the site, and prepare locations for well installation and/or sampling as required.

4. Contract with an experienced union drilling contractor to perform the drilling, soil sampling, and monitoring well installation work required.

5. Contract with an IEPA-approved analytical laboratory to perform the analytical work required on the samples collected during the investigation.

6. Contract with a soils testing laboratory to perform the testing required on the soil samples collected during the investigation.

7. Contract with a geophysical testing firm to perform an electrical conductivity survey on areas east of Dead Creek.

As similar preparatory efforts will have been conducted for Phase I, the only modifications anticipated will be incorporating additional information and data.

D. NONDESTRUCTIVE TESTING

Before subsurface investigations can be safely carried out on the property east of Dead Creek, a nondestructive geophysical ground survey is

proposed. This survey will involve an electromagnetic induction method capable of measuring earth conductivity from the ground surface to a maximum depth of 20 feet. The survey should identify the backfilled (pit) areas; these areas of fill will be avoided during the installation of monitoring wells. Due to safety aspects, wells will not be installed within pit areas.

With the data generated from the survey, and the regional and site specific geologic data, our investigation should be able to determine the presence of drums, differences in fill material, the existence of a plume of contaminated groundwater, and the depth of fill.

The survey is proposed for the entire area east of Dead Creek including the northern section. Since the complete disposal history of the area is unknown, this method is a way to determine if any excavation has occurred. If contamination is encountered on the Darling Fertilizer property, the electromagnetic induction survey is proposed there also to alleviate any concern of buried material.

E. DATA COLLECTION

It is assumed that during the remedial investigation, IEPA will be involved. All sampling and data collection will be performed in accordance with current IEPA requirements. The costs for drilling and sampling are based on the use of Level B protection, which includes self-contained breathing equipment and protective clothing. Down-

grading to a reduced level of protection may be possible after preliminary work is completed. Any downgrading will be reflected in the actual charges to the project.

GROUNDWATER MONITORING

As illustrated in Figure 1, 14 additional monitoring wells are proposed to further delineate contamination. Seven of the proposed wells are east or west of Dead Creek and are designed to investigate impacts the creek and the pit areas have had on the groundwater. Two other wells are planned east of the pit areas to sample the groundwater as it enters the property from the east. Two new wells are also proposed at the northwest and southwest corners of the plant property. All these wells are based on the premise that the preliminary phase indicates contamination in the groundwater entering and leaving the plant property. Two additional wells are also proposed for the former Darling Fertilizer property. Again this is based on the assumption of contamination being found during the preliminary phase.

Costs for the wells are based on installation as specified in Figure 2. Actual screening length and location will be based on results of the preliminary phase and soil conditions encountered during drilling. During installation soil samples of the aquitard and aquifer will be collected for analysis, classification and geotechnical testing. After installation the well will be developed and a groundwater sample obtained.

SURFACE WATER SAMPLING

Surface water sampling from the holding ponds will not be conducted during this phase of the project. The water quality in the Cerro holding ponds (Dead Creek) will previously have been established during Phase I and additional sampling will not be required for this phase of the study.

During overflow conditions discharges from Cerro have been observed to flow directly into the northern end of the creek instead of the sewer manhole. As these discharges have been previously sampled by Sverdrup, further sampling is not required. The sanitary sewer that crosses the northeast portion of the property has been observed to contain a strong organic odor. Another pipe has also been observed discharging into the creek at the north end. Both sewers will be sampled for the parameters listed in Tables 1, 2, and 3. The source of any contamination found will also be investigated.

SEDIMENT SAMPLING

Eight additional sediment samples are proposed to be taken from Dead Creek and analyzed for priority pollutants. These samples are designed to further delineate the areal extent of any contamination found in the first phase of the study. Five samples will be collected from Dead Creek north of the Cerro plant road and three are proposed south of the road.

SOIL SAMPLING

Soil samples will be collected during the installation of the proposed monitoring wells. At a minimum, a surface and a subsurface composite shall be obtained at each well. Additional samples will be obtained should contaminated layers be encountered. Soil samples will also be obtained during drilling for physical classification and testing.

Soil samples will also be obtained from areas east of the creek and south of the plant where runoff has occurred. In an effort to limit the number of samples to be analyzed for priority pollutants, a portable gas chromatograph will be utilized to screen samples. A hundred-foot grid system shall be utilized over the area. A composite sample from every intersection will be analyzed for heavy metals and PCB contamination. Each intersection will also be sampled by installing a collection tube into a five-foot-deep hand-augered hole. This collection tube will have soil gases pulled through it by an above-ground pump. Those areas where soil gas samples indicate a high organic level will be sampled for priority pollutants. By utilizing this method, some uncontaminated samples can be eliminated from future analysis. Based on preliminary information from the 1986 Ecology and Environment, Inc. work at Cerro Copper, a large percentage (50%) of the soil gas grid samples may require priority pollutant analysis. Selected "clean" samples will also be run to confirm the screening method and to verify the extent of contamination. The screening method will also be used as a personnel protection indicator.

A two hundred-foot grid system is proposed for the Darling Fertilizer property should preliminary work indicate contamination is present. The same screening techniques and sampling methods will be utilized.

SAMPLE ANALYSIS AND TESTING

Water Samples

The 14 new monitoring wells and 4 existing wells will be sampled for the pollutant parameters listed in Tables 1, 2, and 3. The existing wells are to be resampled to investigate any changes in contaminant concentrations in the aquifer.

Soil Samples

Based on Sverdrup's technical approach, two soil samples will be collected during the installation of the new monitoring wells and analyzed for priority pollutants. Representative samples from each well will also be physically classified and tested for the properties listed below according to standard ASTM procedures. The number of tests assumed in developing the collection and laboratory costs are noted in parenthesis:

- Specific Gravity (24)
- Water Content (117)
- Particle Size Analysis (38)

- o Permeability (14)
- o Porosity, Void Ratio (19)
- o Atterberg Limits (19)

COMPILE AND REPORT FINDINGS

In addition to the background document to be prepared under the additional information search, Sverdrup will compile all field information and analytical results in a report format for presentation to Cerro and IEPA. The following general tasks will be performed under this activity:

1. Prepare a report to describe the field and analytical activities and summarize the findings of the investigation. Five copies of the report will be provided to Cerro Copper.

2. Discuss the findings and conclusions of the report with Cerro and designated Cerro Copper representatives.

3. If so directed, accompany Cerro representative to discuss the findings and conclusions of the report with IEPA.

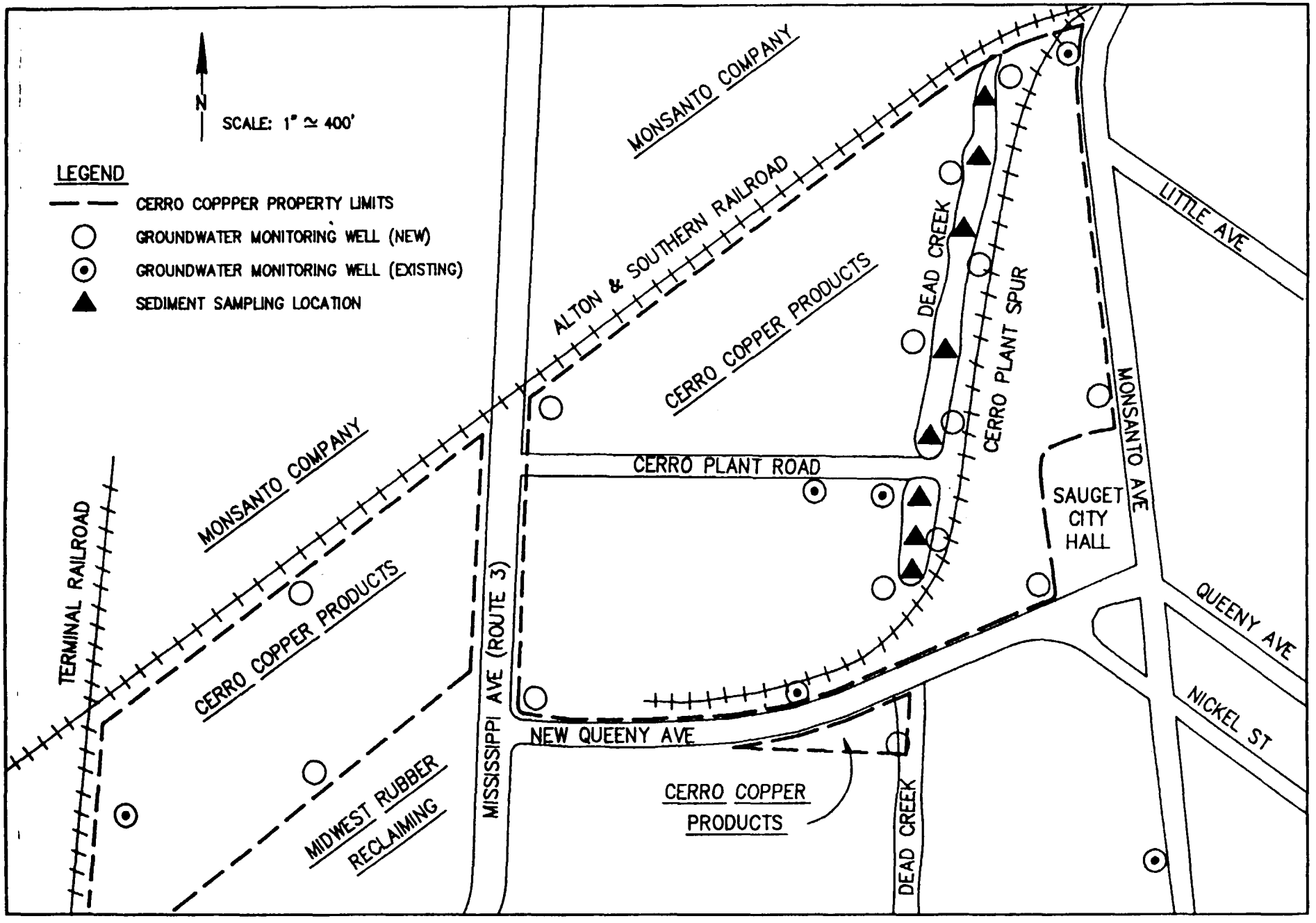

FIGURE 1. SITE MAP AND PROPOSED SAMPLING LOCATIONS

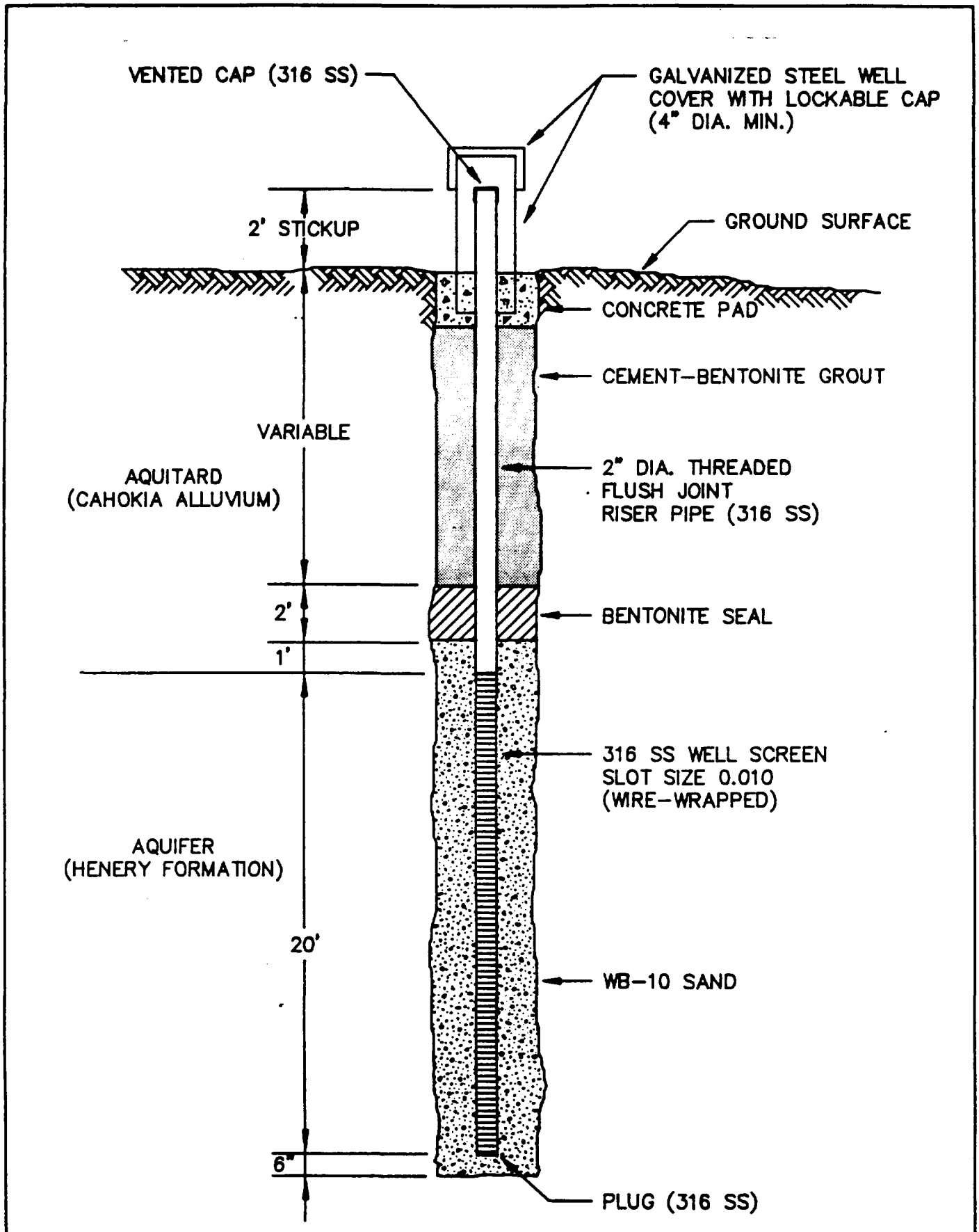

FIGURE 2. TYPICAL MONITORING WELL INSTALLATION

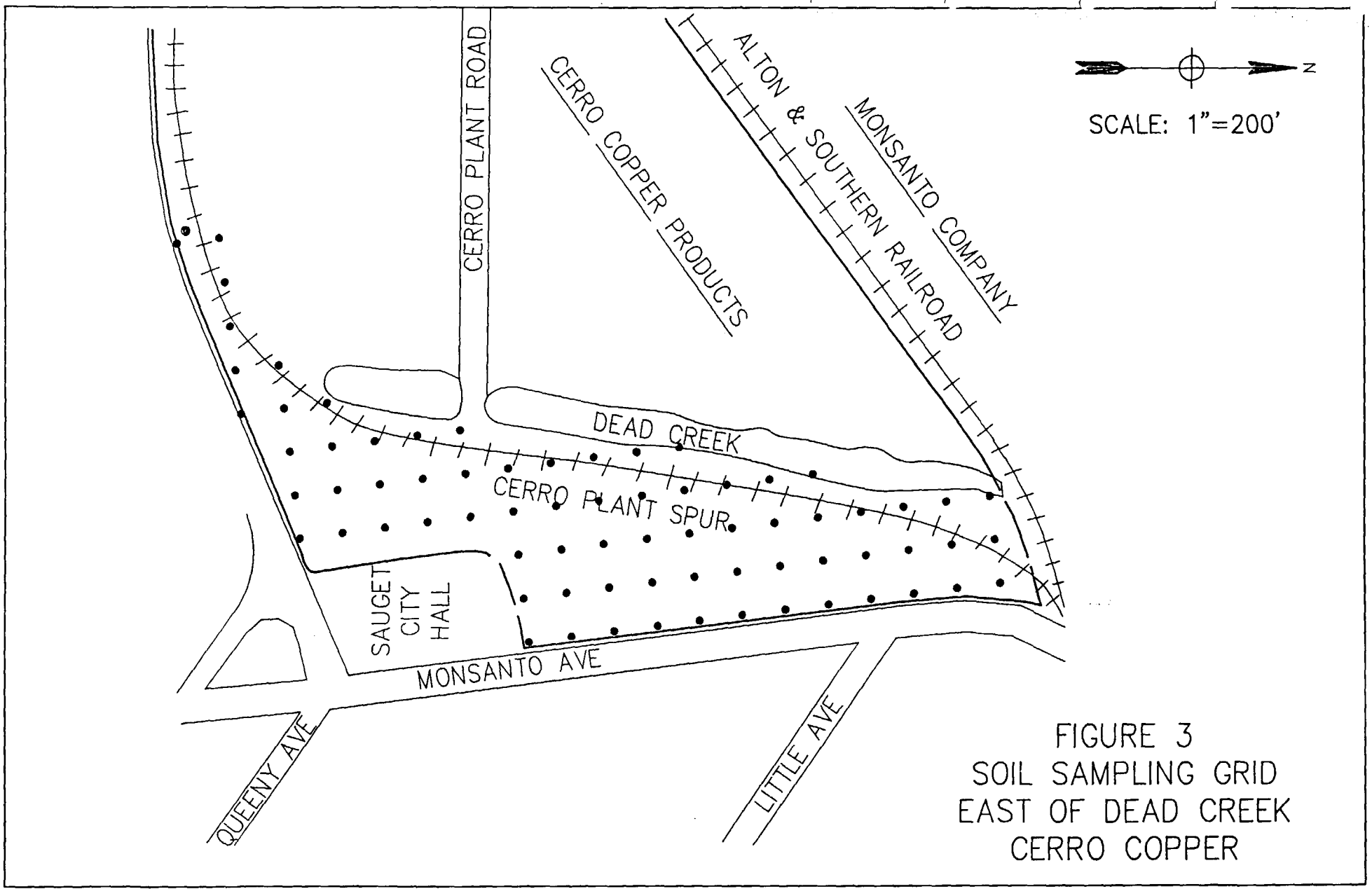

FIGURE 3
SOIL SAMPLING GRID
EAST OF DEAD CREEK
CERRO COPPER

TABLE 1
USEPA PRIORITY POLLUTANTS

ORGANICS

Volatiles	Base/Neutral Compounds	Pesticides
acrolein	acenaphthene	aldrin
acrylonitrile	benzidine	dieldrin
benzene	1,2,4-trichlorobenzene	chlordane
carbon tetrachloride	hexachlorobenzene	4,4'-DDT
chlorobenzene	hexachloroethane	4,4'-DDE
1,2-dichloroethane	bis(2-chloroethyl)ether	4,4'-DDD
1,1,1-trichloroethane	2-chloronapthalene	alpha-endosulfan
1,1-dichloroethane	1,2-dichlorobenzene	beta-endosulfan
1,1,2-trichloroethane	1,3-dichlorobenzene	endosulfan sulfate
1,1,2,2-tetrachloroethane	1,4-dichlorobenzene	endrin
chloroethane	3,3'-dichlorobenzidine	endrin aldehyde
2-chloroethylvinyl ether	2,4-dinitrotoluene	heptachlor
chloroform	2,6-dinitrotoluene	heptachlor epoxide
1,1-dichloroethene	1,2-diphenylhydrazine	alpha-BHC
trans-1,2-dichloroethene	fluoranthene	beta-BHC
1,2-dichloropropane	4-chlorophenyl phenyl ether	gamma-BHC
trans-1,3-dichloropropene	4-bromophenyl phenyl ether	delta-BHC
cis-1,3-dichloropropene	bis(2-chloroisopropyl) ether	PCB-1242
ethylbenzene	bis(2-chloroethoxy) methane	PCB-1254
methylene chloride	hexachlorobutadiene	PCB-1221
chloromethane	hexachlorocyclopentadiene	PCB-1232
bromomethane	isophorone	PCB-1248
bromoform	naphthalene	PCB-1260
bromodichloromethane	nitrobenzene	PCB-1016
chlorodibromomethane	N-nitrosodiphyenylamine	toxaphene
tetrachloroethene	N-nitrosodipropylamine	
toluene	bis(2-ethylhexyl) phthalate	INORGANICS
trichloroethene	benzyl butyl phathalate	Aluminum — Arsenic
vinyl chloride	di-n-butyl phthalate	Chromium — Antimony
	di-n-octyl phthalate	Barium — Selenium
Acid Compounds	dimethyl phthalate	Beryllium — Thallium
2,4,6-trichlorophenol	benzo(a)anthracene	Cobalt — Mercury
p-chloro-m-cresol	benzo(a)pyrene	Copper — Tin
2-chlorophenol	benzo(b)fluoranthene	Iron — Cadmium
2,4-dichlorophenol	benzo(k)fluoranthene	Nickel — Lead
2,4-dimethylphenol	chrysene	Manganese — Cyanide
2-nitrophenol	acenaphthylene	Zinc
4-nitrophenol	anthracene	Boron
2,4-dinitrophenol	benzo(g,h,i)perylene	Vanadium
4,6-dinitro-2-methylphenol	fluorene	
pentachlorophenol	phenanthrene	
phenol	dibenzo(a,h)anthracene	
	indeno(1,2,3-c,d)pyrene	
	pyrene	

TABLE 2
IEPA NONPRIORITY POLLUTANTS

ORGANICS

Volatiles	Acid Compounds	Base/Neutral Compounds
acetone	benzoic acid	aniline
2-butanone	2-methylphenol	benzyl alchohol
carbondisulfide	3-methylphenol	4-chloroaniline
2-hexanone	4-methylphenol	dibenzofuran
4-methyl-2-pentanone	2,4,5-trichlorophenol	2-methylnapthalene
styrene		2-nitroaniline
vinyl acetate		3-nitroaniline
xylene		4-nitroaniline

TABLE 3
OTHER POLLUTANT PARAMETERS

WATER SAMPLES

pH (Field)
Temperature (Field)
Conductivity
Alkalinity
Total Dissolved Solids

III TECHNICAL APPROACH

PHASE III

PURPOSE

The third phase of the investigation is designed to fill in any data gaps and to address any additional areas that, based on results from the previous phases, may be contaminated. Any groundwater plumes identified in Phase II will be further defined, with contaminant dispersion patterns forecasted by using a 2 or 3 dimensional computer model.

Additional monitoring wells and soil samples will probably be required during this phase. Costs are based on the installation of an estimated seven new wells, sampling of all existing and new wells, and obtaining 40 additional soil samples. Screening of the soil samples with a portable gas chromatograph unit will again be utilized during this phase of the study. Since the contamination is currently unknown, samples are costed for analysis based on all parameters shown in Tables 1, 2 and 3. The actual analysis will probably be reduced based on the findings of the previous phases.

As proposed previously in the earlier phases, a work plan, safety plan and final report will be prepared. The final report will include a discussion of remedial options available and their possible use by Cerro Copper for site cleanup.

IV. PERSONNEL

The investigation will be conducted by Sverdrup's Environmental Division under the direction of Dr. Jules Cohen. Assistance will be provided by our Geotechnical Engineering Group.

The investigation will be under the direct technical control of Mr. Edgar Preissner, Sverdrup's environmental principal for hazardous waste management. He will direct our project manager on all technical aspects of the investigation.

Mr. Larry Oliver will serve as our Project Manager. He will work directly with Cerro personnel on all aspects of the works. Mr. Steve Hornung and Mr. Murray Meierhoff of Sverdrup's Environmental Division and Mr. Dennis Boll of Sverdrup's Geotechnical Engineering Group will assist Mr. Oliver in the conduct of the work.

The qualifications and experience of these personnel are included in the form of resumes for your review.

JULES B. COHEN

VICE PRESIDENT, ENVIRONMENTAL DIVISION

Joined Sverdrup in 1979 as Director of the Environmental Laboratory. Became division manager in 1985. Responsible for activities of Sverdrup's Environmental Division.

Professional History

Dr. Cohen was previously Vice President and Director of the Sverdrup Environmental Laboratory at Sverdrup Technology, Inc., Tullahoma, Tennessee. Responsible for laboratory analytical services and environmental engineering studies. Prior to this, he was Deputy Assistant Director for Technical Support, EPA, National Enforcement Investigations Center (NEIC), Denver, Colorado, where he directed laboratory analytical services for all environmental media, the remote-sensing program, and computer technical information services. As Technical Coordinator, EPA NEIC in Denver, Dr. Cohen assisted in coordinating the planning and conduct of studies assessing the impact of industrial and municipal wastewater, air, water, toxic substances, and radiological pollutants on the environment. While Chief, Environmental Sciences Branch, Arctic Health Research Center, Fairbanks, Alaska, Dr. Cohen directed staff conducting research, demonstration projects, and technical assistance toward the solution of environmental health engineering problems of high latitudes and low temperatures. He also taught graduate engineering at the University of Alaska.

Earlier, Dr. Cohen was a Senior Sanitary Engineer with the U.S. Public Health Service at the R. A. Taft Sanitary Engineering Center, directing research and field surveys of water pollution and applying digital computer techniques to stream sanitation and water pollution control.

Recent experience includes consulting services for the Resource Conservation and Recovery Act (RCRA), an environmental audit of NASA's Goddard Space Flight Center, investigations for radioactivity at a school facility in Missouri, and expert witness on water quality chemistry.

Professional Background

Registered Professional Engineer in Tennessee and Colorado
Diplomate, American Academy of Environmental Engineers (AAEE)
Ph.D., Environmental Health Engineering - California Institute of Technology, Pasadena, California, 1965
M.S., Civil Engineering - University of Colorado, Boulder, Colorado, 1958
B.C.E., Civil Engineering, City College of New York, New York, NY, 1955
EPA Bronze Medal for Commendable Service, 1978
Patent, EPA Stage II Vapor Recovery Test Procedure, 1978
USPHS Commissioned Officer Award, 1979
Entered the profession in 1955; joined Sverdrup in 1979

Other Activities

Member, AAEE Adhoc Committee on Hazardous/Toxic Waste Management
Member, EPA Environmental Engineering Peer Review Panel
Former member, Tennessee Air Pollution Control Board
Served as a consultant to the EPA Science Advisory Board and to the Tennessee Department of Public Health
Former member, Surface Water Quality Committee, International Poplar River Water Quality Board of the International Joint Commission

LARRY J. OLIVER

Project Engineer, Environmental Division

Specialized Professional Competence

Municipal and industrial wastewater treatment
Environmental studies and preparation of regulatory documents
Sewer system design
Project management
Plant start-up

Representative Project Assignments

Project engineer for:
- Preliminary and final design of 28-mgd Missouri River Wastewater Treatment Plant for Metropolitan St. Louis Sewer District (MSD), MO
- Design of 6.8-mile Creve Coeur Creek interceptor sewer for St. Louis MSD
- Design of 1.5-mgd industrial wastewater pretreatment facility, 3,000 gpm pumping station, and 12-inch force main for Monsanto Chesterfield Village Research Center
- Design of 2.5-mgd wastewater treatment plant for St. Louis MSD, Caulks Creek watershed, St. Louis County, MO
- Effluent guidelines, new source performance standards, and pretreatment standards studies of textile mills industry for U.S. Environmental Protection Agency (EPA)
- Hazardous waste studies to assess impact of regulations under Resource Conservation and Recovery Act on textile mills industry for U.S. EPA
- Operations investigation and evaluation of design change alternatives for the sewage treatment system at Union Electric Co's Callaway County (MO) nuclear power plant

Design responsibility during construction and start-up phases of the sewage treatment and potable water systems at Union Electric Co's Callaway County (MO) nuclear power plant

Start-up assistance for:
- 70-mgd Eugene-Springfield municipal secondary wastewater treatment facility in Eugene, OR
- 6-mgd Miller Brewing Company industrial water treatment facility in Trenton, OH

Preparation of operations manual supplement and industrial pretreatment program for expansion to City of Perryville, MO wastewater treatment plant

Operations assistance for 80,000 gpd packaged treatment facility located at Union Electric Company nuclear power plant, Callaway County, MO

Representative Project Assignments for Others

Commissioned Officer, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 1970-1974

Professional Background

Registered Professional Engineer in Missouri
MS in Engineering Management - University of Missouri, 1983
MS and BS in Civil Engineering - University of Missouri, 1976 and 1970
Entered the profession in 1970; joined Sverdrup in 1976
Technical publication, Journal of the Water Pollution Control Federation, 1980
Member - American Society of Civil Engineers
- National Society of Professional Engineers
- Water Pollution Control Federation
- Engineer's Club of St. Louis

EDGAR D. PREISSNER

Environmental Principal, Hazardous Waste Management

Specialized Professional Competence

Hazardous waste engineering
Project management
Regulatory guidelines
Wastewater treatment

Representative Project Experience for Others

Management, including profit and loss responsibility, of waste landfill operation consisting of 65 disposal sites nationwide, with gross annual revenues of $65 million. Managed field operations through eight regional managers. Upgraded equipment program and directed development of personnel training, maintenance, and operations manuals. Managed CERCLA and RCRA compliance programs, filing of Part As and Bs, review and development of new landfill designs and plans for operations and closures, and development of remedial designs and corrective construction

Managed design, engineering, operation, and construction of 100-acre waste landfill. Total height of fill was 180 feet, with portion of excavation beneath groundwater table

Developed program management systems for federal study of industrial and hazardous waste impacts on Great Lakes. Established project goals and schedules and developed preliminary data base. Formulated computer model to forecast waste dispersion and impacts

Wrote and implemented engineering study program for assessing industrial and hazardous waste discharges, impact on environment, and judicial source documentation

Evaluated management techniques, and the application of integrated logistic support (ILS) for major projects such as the U.S. Department of Energy's $6 billion Strategic Petroleum Reserve

Managed engineering group for industrial waste site engineering studies and remediation programs. Developed air dispersion computer modeling for waste discharges

In charge of operation and engineering group, with profit and loss responsibility. Directed the design, engineering, and construction of waste processing plants. Implemented effective project planning and management. Implemented projects in Algeria, Brazil, Greece, and Belgium

Professional Background

Registered Professional Engineer in Illinois
MBA in Finance, University of Chicago, 1973
MS in Civil Engineering, University of Wisconsin, 1964
BS in Civil Engineering, Northwestern University, 1961
Entered the profession in 1961; joined Sverdrup in 1986
Member - National Society of Professional Engineers
- American Society of Civil Engineers
- Water Pollution Control Federation

STEVEN M. HORNUNG

Environmental Engineer

Specialized Professional Competence

Water and wastewater treatment
Activated alumina adsorption
Hazardous waste regulations
Water, wastewater, and hazardous waste sampling

Representative Project Assignments

Project manager for contamination assessment and remedial action feasibility study at railroad fueling facility, Dupo, IL
Design engineer on potable water treatment and distribution system at Anheuser-Busch land application site, Jacksonville, FL
Project engineer for hazardous waste audits at industrial plants, St. Louis, MO
Engineer for design of 28-mgd Missouri River secondary treatment plant, Metropolitan St. Louis Sewer District (MSD), St. Louis, MO

Representative Project Assignments for Others

Engineer performing preliminary assessments and site inspections at potential hazardous waste sites, Mississippi and Alabama
Prepared site safety and sampling plans for hazardous waste inspections, Mississippi and Alabama
Project engineer for design of recycling system for process water at veneer manufacturer, Waynesboro, MS

Professional Background

Engineer-in-Training in Missouri
MS and BS in Civil Engineering - University of Missouri-Columbia, 1984 and 1982
Technical presentation on removing selenium from drinking water by adsorption using activated alumina at the AWWA Convention, 1983
Entered the profession in 1984; joined Sverdrup in 1985
Member - American Society of Civil Engineers
- American Water Works Association
- Water Pollution Control Federation
- Hazardous Materials Control Research Institute

MURRAY L. MEIERHOFF

Environmental Scientist

Specialized Professional Competence

Hazardous waste impact assessment, including coverage under RCRA and CERCLA
Water quality surveys and assessment
Water quality standards review
NPDES discharge permit limitations compliance studies
Field sampling

Representative Project Assignments

Remedial investigations and feasibility studies for Missouri Pacific Railroad in Dupo, IL for hydrocarbon contamination in soils and groundwater. Other contaminants include PCB's, phenols, and cyanides
Performed site investigation of suspected hazardous waste dump in western Tennessee to establish the presence and extent of buried drums and associated groundwater contamination
Conducted an assessment of an industrial wastewater treatment system in Mississippi to determine whether the system was subject to RCRA regulations, and whether a waiver provision could be obtained
Maintained an update file on all amendments and changes to RCRA and CERCLA

Representative Project Assignments for Others

Review and revision of State of Iowa's water quality standards as a member of the Iowa Water Quality Review Subcommittee
Participant in the State of Iowa's Section 208 non-point source runoff surveys of small- and medium-size watershed basins in rural Iowa
Field sampling to determine NPDES discharge permit compliance of numerous industrial and municipal wastewater treatment facilities in Iowa
Collection, identification, and data interpretation of water, fish, and benthic macroinvertebrate samples to assess possible impacts from hazardous waste site leachate on the Cedar River, Charles City, IA

Professional Background

MA in Aquatic Biology and BA in Zoology - University of Missouri-Columbia, 1977 and 1974
Entered the profession in 1977; joined Sverdrup in 1981
Numerous professional publications
Hazardous Materials Handling Course reflecting requirements of EPA 1440.2- Health and Safety Requirements for Employees Engaged in Field Activities, and 1440.3 - Respiratory Protection, and EPA's Standard Operating Guides
Member - North American Benthological Society
Past Member - Iowa Water Quality Standards Revision Subcommittee (1980) of the Iowa Water Quality Commission

MARJORIE L. MELTON

Environmental Engineer

Specialized Professional Competence

Hazardous waste permitting assistance
Chemical engineering

Representative Project Assignments for Others

As Public Health Engineer for Bureau of Hazardous Waste Management, Richmond, Virginia, assigned as a chemical engineer to provide technical support to the regulatory board of the Department of Waste Management, governing the management of hazardous waste. Responsible for reviewing permit applications and writing permits in compliance with state and federal hazardous waste management regulations and sound engineering practices; giving consultation on the technical aspects of hazardous waste management; conducting inspections and investigations of hazardous waste management practices; carrying out enforcement actions by developing an evidentual base; and participating in hazardous incident emergency responses

As Process Engineer, Allied Corporation, Hopewell, Virginia, responsibilities included providing justification and process design information for all equipment replacement such as distillation columns, heat exchangers, liquid solid separators and pumps; completing detailed material balance on the unit's bleed system; implementing process changes that resulted in cost savings; conducting studies to decrease nitric acid losses; providing process information for possible sale of waste gas; and completing steam balances for the entire Hopewell plant

As Manufacturing Technology Engineer for Monsanto Chemical Company, Cincinnati, Ohio, assigned as technical support to Manufacturing for the protection of ABS polymer through emulsion polymerization

Professional Background

BS, Chemical Engineering, University of Missouri, Rolla, 1979
Inspectors Training Course, Northwest Hazardous Waste Project
Hazard Evaluation and Environmental Assessment, Environmental Protection Agency
Incineration of Hazardous Waste, Louisiana State University
Hazardous Materials Emergencies, Virginia Department of Emergency Services
Environmental Protection Continuing Education, Johns Hopkins University
Entered the profession in 1979; joined Sverdrup in 1986

DENNIS F. BOLL

Geotechnical Engineer - Hydrologist

Specialized Professional Competence

Planning and supervising subsurface and groundwater investigations
Geotechnical analyses and engineering
Hazardous waste management and investigations

Representative Project Assignments

Project engineer for permit applications assistance at TRADCO, Inc.'s, Washington, MO landfill. Responsibilities included geotechnical investigations, installation of monitoring wells and recommendations for design and construction of landfills

Project engineer for hydrogeologic investigation involving mine tailings impoundment for a confidential client. Project included computer modeling, aquifer resource evaluation, and seepage analysis

Project engineer for groundwater and soil contamination investigations for a major chemical producer at plants in New Jersey, South Carolina, Illinois, Idaho, Texas, and Ohio. Mr. Boll has been involved full time on this assignment for the last 14 months. His work involves supervising soil, hazardous waste, and groundwater sampling; installation of monitoring systems; analyses of groundwater and contaminant flows; and geophysical studies. He is responsible for making recommendations for containment, and for maintaining site health and safety during the field investigations

Groundwater and soil contamination investigation at a manufacturing plant in southeastern Minnesota

Evaluation of existing hydrogeologic conditions surrounding a major chemical plant in Texas

Specialty sampling of offshore sediments prior to dredging operation in northern Indiana

Foundation investigation for additions to automobile manufacturing plants in central Ohio and northeastern Indiana

Evaluation of embankment designs for a sanitary landfill in Illinois

Professional Background

Engineer-in-Training, State of Missouri

MS in Geological Engineering with emphasis in geotechnical engineering and hydrogeology, University of Missouri, Rolla, 1982

BS in Geological Engineering (Magna Cum Laude), University of Missouri, Rolla, 1981

University of Missouri - Rolla, 1981-1982
- Graduate Teaching Assistant in engineering geology, remote sensing and site evaluation, and subsurface exploration
- Developed small calculator programs that quickly interpret and solve well pumping test data

Curators Scholar, 1977-1981

Chancellor's Fellow, 1981-1982

Entered the profession in 1982; joined Sverdrup in 1984

Member - Association of Engineering Geologists
- Missouri Society of Professional Engineers
- Tau Beta Pi, Phi Eta Sigma

V. SCHEDULE

Our work sequence and estimated schedule to perform the work outlined in our proposal are illustrated below by listing the total calendar days required from your notice to proceed for the sequence of activities. The activities represent specific milestones of the investigation.

Activity	Calendar Day
Notice to Proceed	0
Complete Additional Information Search	21
Develop Work Plan and Schedule	35
Develop Health and Safety Plan	35
Develop QA Plan	42
Approval of Plans from IEPA	77
Negotiate Subcontracts	84
Conduct Geophysical Testing	105
Install Monitoring Wells	133
Collect Soil and Sediment Samples	133
Collect Surface Water Samples	133
Collect Groundwater Samples	154
Compile Analytical and Testing Results	189
Prepare and Issue Report of Findings	224

VI. COSTS AND FEE BASIS

The following tabulation provides our estimate of the manhour requirements to perform the proposed work, for Phase II.

	MANHOURS			
Activity	Management	Engineering[1]	Field	Clerical
Information Search	2	56	-	6
Aerial Survey	8	100	96	4
Preparation for Field Work	60	320	16	40
Data Collection	68	16	1,464	6
Sample Analysis & Testing	8	12	-	-
Compile & Report Findings	48	400	-	32
TOTALS	194	904	1,576	88

The following tabulation provides our estimate of the direct cost requirements to perform the proposed work, for Phase II.

Direct Cost Area	Dollars
Subcontract-Aerial Survey	3,000
Subcontract-Geophysical Testing	10,300[2]
Subcontract - Well Installation	84,000[2]
Subcontract - Chemical Analysis	246,000
Subcontract - Soil Testing	7,000
Sverdrup Subcontract Fee (5%)	17,500
Principals Time	1,000
Telephone	300
Transportation	1,000
Word Processing	700
Computer (Auto CADD)	700
Reproductions	500
Equipment Rental	7,000[2]
Materials	7,000[2]
Air Freight (Samples)	2,000
Miscellaneous	1,000
TOTAL DIRECT COSTS	$389,000

The following tabulation provides a summary of the estimated costs and fee basis for the proposed work for Phase II.

Item	Dollars
Salaries	50,200
Salary Related Expenses	15,500
Overhead & Profit (2.15 Factor)	64,600
Direct Costs	389,000
TOTAL FEE	$519,300

(1) Includes manhours for drafting

(2) These entries reflect Level B protection during well drilling. Significant reductions are possible if the worker protection level can be downgraded for part of the work.

COSTS AND FEE BASIS - PHASE III

The costing of Phase III is based on the assumption that the Phase I and II investigations are completed and results are available. Level B protection was again assumed for drilling. As the contaminants present on the site are currently unknown, the analytical sampling was costed for priority pollutant analysis. Decreases in protection required and analysis will effect those charges to Cerro Copper.

The best estimate based on the work described in Section III: Technical Approach - Phase III is $250,000. This includes all direct costs and salary expenses for an estimated 1350 manhours required to perform the work.

SVERDRUP CORPORATION
STANDARD CONTRACT PROVISIONS
TERMS OF PAYMENT—COST REIMBURSABLE BASIS

A. SALARY COSTS, OVERHEAD & PROFIT

As compensation for our services, we will be reimbursed for the salary costs of our professional, technical and supporting personnel for the time during which they are directly employed in work covered by this agreement, multiplied by a factor of 2.15 to cover overhead and profit.

1. Salary costs are defined as the salaries paid for regular time and overtime (including any premium overtime) worked, plus provision for applicable annual salary related expenses, including sick leave, vacation pay, holiday pay and other ordinary and customary paid time off, bonuses, the employer's portion of social security, unemployment and other payroll taxes, Employee's Retirement and Benefit Plan contributions, employer's portion of group hospitalization and medical insurance, and the cost of worker's compensation insurance.

2. Included in overhead are:
   (a) The salaries of officers, except for technical or advisory services directly applicable to the project.
   (b) The salaries of employees doing general administrative work; also nonproductive professional and technical salaries, including maintenance of staff to provide readiness to serve.
   (c) Rent and costs of light, heat and water; equipment depreciation and maintenance cost; costs of office supplies and reproduction of data for our internal use; general communications expense, including local telephone calls and postage; taxes; insurance premiums and license fees; automotive expense and other transportation and travel expense not chargeable to specific contracts; and other miscellaneous costs.

B. OTHER REIMBURSABLE COSTS

In addition, we will be reimbursed for the following:

1. Travel, subsistence, and incidental expenses of personnel while traveling in connection with the work. The costs of a change of employee's residence are reimbursable if required by the work.

2. Transportation by passenger automobiles that we supply intermittently in connection with the work, at the rate of 21 cents per mile. All costs of owned, leased or rented passenger vehicles assigned to the work and car allowances granted to management and supervisory personnel are reimbursable. Reimbursement for the cost of special types of vehicles will be at rates to be mutually agreed upon when such vehicles are required.

3. Reproduction of drawings, photographs, maps, charts and reports which are prepared for the Client's periodic or interim review and also the cost of the reproductions which constitute the delivery of work.

4. Wire and wireless communication of messages and data in connection with the work.

5. Insurance required by the Client in addition to the coverages or in excess of the limits normally carried.

6. Subcontracted services such as, but not limited to, borings, surveys, photogrammetry, testing and computing services, if required in the performance of the work, plus an amount equal to 5% thereof to cover cost of handling.

7. Technical support services provided from our own facilities, as required in the performance of the work.

8. Special consultants, as approved by the Client, if required in the performance of the work, plus an amount equal to 10% thereof to cover the cost of handling.

9. Technical and advisory services of officers directly applicable to the project at the hourly rate of $100.

C. TERMS OF PAYMENT

Invoices for actual work performed and cost incurred will be submitted at four-week intervals with payment due upon presentation. Interest of 1% per month (or any lesser legal limit applicable) will be charged on invoice amounts outstanding more than 45 days from invoice date.

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The above provisions are predicated on the work being performed in our regularly established offices and may be subject to revision if separate offices are necessary for project purposes.

SVERDRUP CORPORATION
STANDARD INDEMNIFICATION CONDITIONS

1. Sverdrup will indemnify, defend, and hold harmless Cerro Copper Products from all claims and suits for loss of or damage to property, or personal injury, including death to all persons, including Sverdrup, Sverdrup's employees, agents, or servants, and from all judgments recovered therefore, including court costs and attorney's fees and other expenses, arising out of errors, omissions, or negligent acts of Sverdrup, Sverdrup's employees, agents or servants, subcontractors or their employees, in connection with or as a result of services defined in this proposal.

2. Sverdrup will develop a plan using generally accepted engineering practices and standards for Cerro Copper Products Company approval detailing remedial activities to be taken by Sverdrup to minimize any forseeable releases that may be encountered during execution of the proposed work. However, Cerro Copper Products Company shall defend and indemnify Sverdrup, its consultants, agents, and employees, from and against all claims, damages, losses, and expenses arising out of the performance of the proposed work, or the performance of work by others and which result from the actual, alleged, or threatened discharge, dispersal, release, or escape of any solid, liquid, gaseous, or thermal irritant or contaminant, including smoke, vapor, soot, fumes, acids, alkalis, chemicals, and waste.